

Claims

1. An apparatus based on a telecentric imaging system for forming an image of a linear zone (17) of an object (1), the apparatus comprising:

- a non-telecentric camera (9) comprising an objective (8) and an image plane (19) formed of a row (15) of photosensitive cells;

5 - placed between the objective and the object, telecentric imaging means (18) comprising a concave strip mirror (6), which is substantially aligned with said row of cells and with the aperture of said objective located in its focal plane, the concave strip mirror and the objective jointly forming a telecentric image of the object on the row of photosensitive cells; and

10 - a light source (7) producing radiation (3) directed to the object,
characterised in that in the apparatus said concave strip mirror is one parabolic mirror (6); and that the telecentric imaging means (18) also comprise, disposed between said parabolic mirror and the objective, a strip-like plane mirror (5), through which the directed radiation (4) reflected from the object (1) and the
 15 parabolic mirror strikes the objective (8) and then the image plane (19) in order to obtain a sharp image of the width parts of the object for measurement of at least one dimension (D1 and/or D2 and/or D3 ... Dn) of these.

2. An apparatus as defined in claim 1, **characterised** in that said strip-like parabolic mirror (6) is a planar parabolic mirror; that the lengths (L2 and L1) of said strip-like planar parabolic mirror and strip-like plane mirror (5) are mutually aligned and aligned with the row (15) of photosensitive cells forming the image plane; and that
 5 the reflective surfaces (25 and 26, respectively) of the plane mirror (5) and said planar parabolic mirror (6) are directed towards each other such that the width (W1 and W2) of each is reflected from the reflective surface of both at a predetermined angle (K1, K2).

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3. An apparatus as defined in claim 2, **characterised** in that the distance (S1) of the strip-like mirror (5) from the objective is at least 1.5 times the distance (S2) of the planar parabolic mirror (6) from the objective; and that the plane mirror (5) and the planar parabolic mirror (6) are mutually spaced by a distance (P1) perpendicular to their length, the distance being at least equal to half of the combined width (W1 + W2) of these mirrors and at the most five times the combined width (W1 + W2) of these mirrors.

4. An apparatus as defined in claim 2 ~~or 3~~, **characterised** in that the normal (N2) to the reflective surface (26) of the strip-like planar parabolic mirror is at a maximum 30 °C angle (K3) relative to the normal (N1) to the object, and that the angle (K4) between the normals (N2 and N3) to the reflective surfaces (26 and 25) of the planar parabolic mirror and the plane mirror is 30 ° at the most.

5. An apparatus as defined in claim 1 ~~or 2~~, **characterised** in that the length (L2) of the strip-like parabolic mirror or the planar parabolic mirror, respectively, is substantially greater than its width (W2); and that at least the length (L2) of the parabolic mirror or the planar parabolic mirror, respectively, is greater than the width (L3) of the object to be observed.

6. An apparatus as defined in claim 1 ~~or 2~~, **characterised** in that the reflective surface (26, 25) of the strip-like parabolic mirror or the planar parabolic mirror (6), respectively, and of the strip-like plane mirror, is a metal surface which is open at the reflection side.

7. An apparatus as defined in claim 1 ~~or 2~~, **characterised** in that the light source (7) is a scattered light source which is independent of the telecentric imaging means and

is located adjacent to the telecentric imaging means (18) at a distance (P2) transverse to the direction of movement of the radiation (4) passing through them, whereby said imaging means (18) receive scattered light reflected from the object (1).

8. An apparatus as defined in claim 5, **characterised** in that said transverse distance (P2) of the scattered light source is substantially smaller than the distance (H) between the parabolic mirror or the planar parabolic mirror, respectively, and the object; and that said scattered light source comprises one or more lamps (7; 7a, 7b) having a substantial area (A), the more than one lamps (7a and 7b) being mutually spaced principally over the width (L3) of the object by distances (P3) parallel with the length (L2) of the parabolic mirror or the planar parabolic mirror, respectively, in order to provide a substantially homogenous scattered light (3) at the object (1).

9. A method for forming a telecentric image of an opaque object (1) located on an opaque and non-reflective substrate (20) with a telecentric system, in which:

- the scattered light (3) is allowed to be directed to the object (1) over its entire width (L3) to be inspected;

- radiation (24) reflected from the object is collected with a concave strip mirror (6) and is allowed to be rereflected from the concave mirror as a bundle (4) of rays;

- in said reflective bundle of rays a camera (9) is provided by the objective (8) and the row (15) of photosensitive cells with the objective aperture located substantially in the focal plane of the concave strip mirror, the concave strip mirror and the objective forming jointly a telecentric image of a linear strip (17) of the object on the row of photosensitive cells,

characterised in that the method additionally comprises:

- allowing the object (1) to move (F) in a direction substantially perpendicular to said linear strip (17),

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